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(71) Applicant(s)  
**BAK(GB) Limited**

(Incorporated in the United Kingdom)

**3 Blackwell Drive, Springwood Industrial Estate,  
BRAINTREE, ESSEX, CM7 7QJ, United Kingdom**

(72) Inventor(s)  
**Raymond Keith Brierley**

(74) Agent and/or Address for Service  
**A A Thornton & Co**  
**Northumberland House, 303-306 High Holborn,  
LONDON, WC1V 7LE, United Kingdom**

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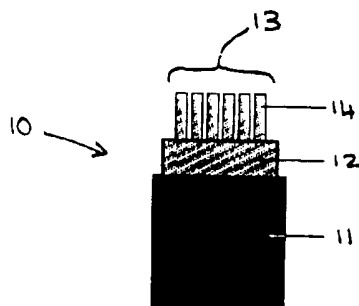
(52) UK CL (Edition O )  
**H1A AKL**

(56) Documents Cited  
**GB 2059140 A GB 2009488 A GB 1583957 A**  
**GB 1480090 A EP 0260373 A EP 0222683 A**  
**US 3576940 A**

(58) Field of Search  
UK CL (Edition O ) **H1A AKL**

(54) **Fire and moisture resistant electric cable**

(57) An electric cable comprising a conductor encased in a sheath of moisture proof material surrounded by a sheath of fire retardant material A telecommunications cable has a sheath 12 of polyethylene or polypropylene, and a sheath 11 of low smoke zero halogen (LSZH) material.



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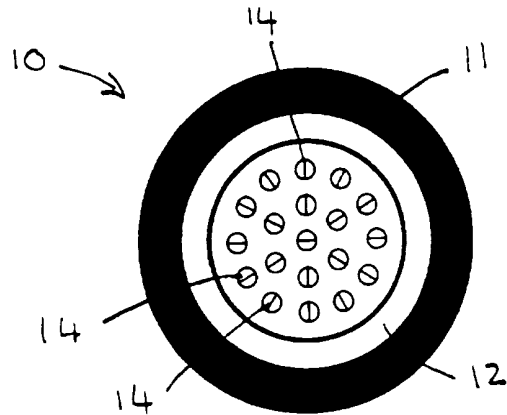


FIG 1

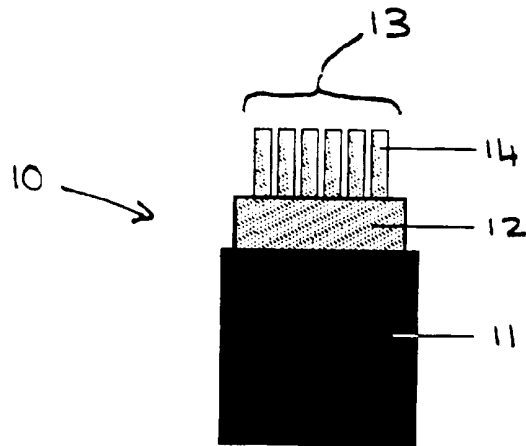


FIG 2

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IMPROVEMENTS IN AND RELATING TO ELECTRICAL CABLES

The present invention relates to cables for conducting electrical signals for use in telecommunications, for example.

There are currently available two different types of electrical telecommunications cable, one for external use which is suitable for burying underground in ducting and one for internal use which is suitable for use in buildings. External cables have to be extremely moisture resistant so that they can be left in situ for the product lifetime without the need for maintenance and/or replacement. A criterion for internal cables is that they must not propagate fire, and a more recent requirement is that they should not give off hazardous fumes, such as chlorine or other halogen gases or hydrogen chloride, if burnt.

At present, the most common external cable comprises the usual individually insulated multipair wires wrapped in a tape to keep them together, the whole insulated wire bundle being encased in a polythene outer sheath. It is normal practice for a jelly-like substance to fill the spaces between the individually insulated wires. This type of cable is not suitable for internal use because the polythene and the jelly-like substance propagate fire and may also give off hazardous fumes when burnt.

Current internal cables typically comprise individually insulated multipair wires encased in a P.V.C. outer sheath which is fire resistant but generally does contain hazardous chemicals. However, the outer sheath is not sufficiently moisture proof for external use in underground ducting.

With currently available internal and external cables, terminations have to be made at the entrances to buildings and connections have to be made between internal and external cables. This obviously contributes to the complexity and expense of any cable-laying operation. Another disadvantage of the currently available cables is that the internal and external cables usually use different colour combinations for the insulation of the multipair wires. External cables usually use single colours and internal cables use band marking. It would clearly be advantageous to provide a single cable which is equally suitable for both internal and external use.

According to the present invention a conductive cable is provided with an outer sheath of fire retardant material and an inner sheath of moisture proof material. The moisture proof material renders the cable suitable for long term external use and may be a material which propagates fire. However, the outer sheath of fire retardant material ensures that fire cannot propagate and renders the cable as a whole suitable for internal use.

The cable comprises at least one conductive wire and preferably, especially for telecommunications applications, a bundle of conductive wires which are insulated from each other and then encased by a first (inner) sheath and a second (outer) sheath. Preferably the wires are individually encased in respective insulating sheaths in the usual way. The insulating material may be PVC.

The first or inner sheath may be made from polyethylene or any other waterproof material such as polypropylene. The second or outer sheath is preferably made from a material which does not give off noxious fumes when burnt, such as the now commonly available "Low Smoke Zero Halogen" (LSZH) which is used in cabling applications. LSZH is a flexible rubber-like material. However, other materials such as PVC which is fire retardant can be used if required.

An embodiment of the present invention will now be described in detail by way of example only and with reference to the accompanying drawing in which:

FIGURE 1 is a cross-sectional view through a telecommunications cable according to the invention; and

FIGURE 2 is a plan view showing the cable partly stripped to reveal the layers of its construction.

Referring to the drawing, the illustrated cable 10 comprises an outer sheath 11 of Low Smoke Zero Halogen (LSZH) material and an inner sheath 12 of moisture proof material, such as polyethylene, which surrounds a wire bundle 13 of individually insulated wires 14. The insulation material for the individual wires 14 is typically PVC, suitably colour coded according to industry Standards or customer's requirements. Although not shown in the drawing, the wire bundle 13 would typically include several matching pairs of insulated wires and an earth wire of larger diameter having a thicker insulation layer, running along the centre of the bundle.

The wires are typically circular in section and thus the surrounding insulations, the inner sheath 12 and the outer sheath 11 are substantially cylindrical, at the same time being flexible. In practical applications the wires 14 would be closely packed and are illustrated spaced for the sake of clarity. Preferably the outer sheath 11 closely surrounds the inner sheath 12 so that there is no

air space between the two.

Each individual wire (excluding insulation) is typically 0.5mm in diameter.

Cables according to the invention would typically be available with various numbers of pairs of wires 14 and various outer diameters. Suitable variations might be as follows:

<u>Cable Type</u>	<u>Outer Diameter</u>
10 pairs + Earth	8.6mm
20 pairs + Earth	12.0mm
40 pairs + Earth	15.0mm
60 pairs + Earth	18.8mm
80 pairs + Earth	22.5mm
100 pairs + Earth	26.5mm
160 pairs + Earth	30.3mm
320 pairs + Earth	39.5mm

The outer sheath 11 is preferably black in colour and the inner sheath grey, to match currently available telecommunications cables.

It will be appreciated that the cable of this invention can be led straight from underground into a building, for example, without the need for special connections and time consuming colour matching of the paired wires.

CLAIMS

1. A cable for conducting electrical signals comprising at least one conductive wire encased in a first sheath of moisture proof material, surrounded by a second sheath of fire retardant material.
2. A cable as claimed in claim 1 in which the first sheath encases a bundle of conductive wires which are insulated from each other.
3. A cable as claimed in claim 2 in which the wires are individually encased in respective insulating sheaths.
4. A cable as claimed in any preceding claim in which the first sheath is made from polyethylene material.
5. A cable as claimed in any preceding claim in which the second sheath is made from a material which does not give off noxious fumes when burnt.
6. A cable as claimed in any preceding claim in which the second sheath is made from low smoke zero halogen material.
7. A cable substantially as herein before described by way of example only and with reference to the accompanying drawing.

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**Patents Act 1977**  
**Examiner's report to the Comptroller under Section 17**  
**(The Search report)**

Application number  
 GB 9422403.7

**Relevant Technical Fields**

- (i) UK Cl (Ed.O)      H1A (KL)  
 (ii) Int Cl (Ed.6)

Search Examiner  
 J L FREEMAN

Date of completion of Search  
 30 JANUARY 1996

**Databases (see below)**

- (i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
 1 TO 7

(ii)

**Categories of documents**

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>X:</b> Document indicating lack of novelty or of inventive step.</p> <p><b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p><b>A:</b> Document indicating technological background and/or state of the art.</p> | <p><b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.</p> <p><b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p><b>&amp;:</b> Member of the same patent family; corresponding document.</p> |
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Category	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2059140 A (PIRELLI) whole document	1 to 6
X	GB 2009488 A (BICC) whole document	1 and 4 to 6
X	GB 1583957 (BICC) whole document	1 and 4 to 6
X	GB 1480090 (PIRELLI) whole document	1 to 6
X	EP 0260373 A (KABELMETAL) pages 5 and 6	1, 5 and 6
X	EP 0222683 A (SIEMENS) page 1	1 and 4 to 5
X	US 3576940 (J G STONE & G S BUETTNER) all figures	1 to 3

**Databases:** The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).